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Estimation of land use change and reservoir sedimentation using remote sensing data

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This study was carried out with the objectives of identifying land use change occurring in Uma Oya catchment using satellite remote sensing data and relating the changes with soil erosion and reservoir sedimentation occurring in this area. IRS LISS II satellite imagery of 1992 March and IRS LISS III imagery of 1998 February were digitally analyzed and land use maps were prepared to identify the land use changes. Soil erosion rates under different land cover conditions and sedimentation information of Rantembe reservoir were used to study the impact of land use change on soil erosion and sedimentation. Seven land use classes namely, natural forest, forest plantations, scrublands, paddy, annuals, other plantations and water identified in the area using satellite imagery with 67.5% and 75% accuracies respectively for 1992 and 1998.

An average soil loss of 16.2 t/ha/y and 17.15 t/ha/y were estimated for 1992 and 1998, respectively. Capacity: inflow ratios (C/I) and Trap efficiencies for the Rantembe reservoir were calculated by analyzing the sedimentation data. The C/I ratio has reduced from 0.0304 to 0.0241 during the period. Satellite remote sensing provides up-to-date digital information on land use conditions on the ground. The accuracy of the extracted information depends on the spatial resolution of the images. Accordingly, IRS LISS III which is having higher spatial resolution compared to IRS LISS II (23.5 m and 36.25 m respectively) is better in the extraction of land cover information. The calculated soil losses show that the soil erosion has increased from 16.21 t/ha/y to17.15 t/ha/y during the period as a result of land use change. The catchment needs a proper land use plan to reduce inappropriate changes to present land use, which accelerate soil erosion and sediment transport.

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